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EXAMINER

PATHAK, SUDHANSHU C

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/530,595

**Applicant(s)**

TROYA ET AL.

**Examiner**

SUDHANSHU C. PATHAK

**Art Unit**

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 November 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 and 19-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16, 17, 19 and 20 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-10 and 21 is/are rejected.
- 7) ☒ Claim(s) 5 and 11-15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 November 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-849)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 11/26/2008
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. Claims 1-17 & 19-21 are pending in the application.
2. Claim 18 has been canceled.

### ***Response to Arguments***

3. Applicant's arguments, with respect to the Drawing Objections have been fully considered and are persuasive. Therefore, the drawing objections have been withdrawn.

In regards to the specific argument that "Tore fails to disclose or suggest eliminating an accumulation of a phase error of the pilot over a sequence of pilots, and therefore Tore fails to disclose or suggest "eliminating an accumulation of a phase error of the partial signal, caused by a sampling frequency error, over the sequence of the partial signals," as claimed. Instead, each pilot signal is treated in an isolated manner, i.e. without consideration of such a phase-error accumulation over a sequence of pilot signals", this is incorrect. Tore indeed discloses the equalization step includes a step of at least partially eliminating an accumulation of a phase error of the partial signal, caused by a sampling frequency error, over the sequence of the partial signals, such that the accumulation is negligible (Fig. 6, elements 15, 17, 19-20 & Fig. 7, elements 15, 17, 20-21 & Fig. 8-14 & Column 10, lines 19-45, 55-67) {Interpretation: The reference discloses computing the average phase rotation over several (or all) complex QAM values and further inputs the average phase rotation into a low pass filter which further performs an averaging of the phase rotation over successive data (pilot) symbols}.

In regards to the specific argument that "Beukema, however, fails to disclose or suggest the features of claim 1 that are lacking in Tore, namely "the equalization step includes a step of at least partially eliminating an accumulation of a phase error of the partial signal, caused by a sampling frequency error, over the sequence of the partial signals, such that the accumulation is negligible, and the estimation step includes a step of detecting a plurality of predetermined pilot signals and a step of determining a phase correction factor on the basis of the detected pilot signals, wherein at least one multiplication operation is carried out solely by means of shift and adding operations." Therefore, applicant respectfully submits that Tore and Beukema, taken singly or in combination, fail to render claim 1 obvious", this is incorrect. Tore indeed discloses the equalization step includes a step of at least partially eliminating an accumulation of a phase error of the partial signal, caused by a sampling frequency error, over the sequence of the partial signals, such that the accumulation is negligible (Fig. 6, elements 15, 17, 19-20 & Fig. 7, elements 15, 17, 20-21 & Fig. 8-14 & Column 10, lines 19-45, 55-67) {Interpretation: The reference discloses computing the average phase rotation over several (or all) complex QAM values and further inputs the average phase rotation into a low pass filter which further performs an averaging of the phase rotation over successive data (pilot) symbols}.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-4, 6-9, 10 (method) & 21 (device) are rejected under 35 U.S.C. 103(a) as being unpatentable over Tore (6,310,926) in view of Beukema (6,393,083).

In regards to Claims 1, 6-9 & 21, Tore discloses a method (device) of reducing a phase error caused by a plurality of error sources in a signal which is present in a digital frequency representation in the form of a sequence of a plurality of digital partial signals which are associated with a number of subcarriers ( $k$ ) of a carrier (Fig. 6 & Column 1, lines 25-40, 55-67 & Column 2, lines 1-25 & Column 3, lines 60-67 & Column 4, lines 15) {Interpretation: The reference discloses a multicarrier systems including a OFDM system, wherein the symbols transmitted are transmitted over a plurality of subcarriers wherein each subcarrier comprises a partial signal (symbol)}, with the steps which are effected for each partial signal: equalization of the partial signal ( $Y(i,k)$ ) (Fig. 6, element 17 & Column 4, lines 56-67 & Column 5, lines 1-10); estimation of the phase error of the equalized partial signal ( $X(i,k)$ ) (Fig. 7, element 20-21 & Fig.'s 8-10 & Column 5, lines 61-67 & Column 6, lines 1-15 & Column 7, lines 23-65 & Column 9, lines 33-55 & Column 10, lines 19-55 & Column 12, lines 10-41), and correction of the estimated phase error of the equalized partial signal, characterized in that the equalization step includes a step of at least partially eliminating an accumulation of a phase error of the partial signal, caused by a sampling frequency error, over the sequence of the partial signals, such that the accumulation is negligible (Fig. 6, elements 15, 17, 19-20 & Fig. 7, elements 15, 17,

20-21 & Fig. 8-14), and the estimation step includes a step of detecting a plurality of predetermined pilot signals and a step of determining a phase correction factor on the basis of the detected pilot signals (Column 4, lines 25-57). However, Tore does not disclose at least one (without) multiplication operation is carried out solely by means of shift and adding operations. Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention that there is no criticality in implementing 52 subcarriers in the multicarrier system, this is a matter of design choice depending on the application and the system bandwidth and spectrum allocation. Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention that there is no criticality in selecting four pilot subcarriers for the transmission of pilot signals with which the ordinal numbers -21, -7, 7 and 21 are associated with the following numbering of the subcarriers: -26, -25, -24, ..., -1, 1, 2, 3, ..., 26 this is a matter of design choice depending on the application and standard implemented in the OFDM system.

Beukema discloses a method for reducing phase error implemented by at least one multiplication operation is carried out solely by means of shift and adding operations (Column 5, lines 20-47). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Beukema discloses implementing by at least one multiplication operation is carried out solely by means of shift and adding operations and this is implemented in the method as described in Tore so as to minimize the computationally intensive complex multiplication and performing the same operation by low complexity operation of shifting and adding.

In regards to Claims 2-4, Tore in view of Beukema discloses a method of reducing a phase error caused by a plurality of error sources in a signal as described above. Tore further discloses the equalization step includes a step of division of the partial signal by a complex second signal which has the phase of the partial signal proceeding in the sequence of the partial signals (Fig.'s 6-7, elements 17-18) wherein the second signal represents a frequency response function of the associated subcarrier for the preceding partial signal in the sequence of partial signals (Fig.'s 6-7, elements 17-18 & Column 4, lines 58-67 & Column 5, lines 1-20). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Tore in view of Beukema satisfies the limitations of the claims.

In regards to Claims 10, Tore in view of Beukema discloses a method of reducing a phase error caused by a plurality of error sources in a signal as described above. Tore further discloses the correction step includes a step of complex multiplication of the equalized partial signal with the phase correction factor (Fig. 6, element 17-18 & Fig. 8-9 & Fig. 10, element 216). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Tore in view of Beukema satisfies the limitations of the claims.

***Allowable Subject Matter***

6. Claims 16-17 & 19-20 are allowable over the Prior Art of record.
7. Claims 5, 11-15 (method) are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SUDHANSHU C. PATHAK whose telephone number is (571)272-5509. The examiner can normally be reached on 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on 571-272-3042.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sudhanshu C Pathak/  
Primary Examiner, Art Unit 2611